

WHAT IS CLAIMED IS:

1. A substrate transfer apparatus for removing a substrate from a substrate accommodating tray accommodating the substrate in a horizontal state, the substrate transfer apparatus comprising:

a plurality of support pins for raising the substrate accommodated in the substrate accommodating tray above the substrate accommodating tray,

wherein:

the substrate accommodating tray includes a plurality of openings through which the plurality of support pins are to be inserted,

the plurality of support pins are moved up relative to the substrate accommodating tray and are inserted through the plurality of openings of the substrate accommodating tray, so as to raise the substrate, and

the plurality of support pins each have a length sufficient to be vertically inserted through a plurality of substrate accommodating trays stacked vertically.

2. A substrate transfer apparatus according to claim 1, further comprising an elevatable table for raising and lowering the substrate accommodating tray while having

the substrate accommodating tray on the elevatable table, wherein the plurality of support pins are inserted through the plurality of openings of the plurality of substrate accommodating trays stacked vertically on the elevatable table as the elevatable table moves down.

3. A substrate transfer apparatus according to claim 2, wherein the elevatable table is moved up and down by a ball screw mechanism.

4. A substrate transfer apparatus according to claim 2, wherein the elevatable table is moved up and down by a belt transport mechanism.

5. A substrate transfer apparatus for removing a substrate from a substrate accommodating tray accommodating the substrate in a horizontal state, the substrate transfer apparatus comprising:

a tray holding unit for holding, in a horizontal state, at least one of a plurality of substrate accommodating trays stacked vertically; and

a plurality of support pins for raising a substrate accommodated in a prescribed substrate accommodating tray which is released from the tray holding unit above the

prescribed substrate accommodating tray,

wherein:

the plurality of substrate accommodating trays each include a plurality of openings through which the plurality of support pins are to be inserted, and

the plurality of support pins are moved up relative to the prescribed substrate accommodating tray and are inserted through the plurality of openings of the prescribed substrate accommodating tray, so as to raise the substrate accommodated in the prescribed substrate accommodating tray.

6. A substrate transfer apparatus according to claim 5, wherein the plurality of support pins are inserted into the plurality of openings of a plurality of substrate accommodating trays released from the tray holding unit, so as to raise the substrate accommodated in the prescribed substrate accommodating tray.

7. A substrate transfer apparatus according to claim 5, further comprising an elevatable table for raising and lowering at least one substrate accommodating tray released from the tray holding unit while having the at least one substrate accommodating tray on the elevatable

table,

wherein, where a plurality of substrate accommodating trays stacked vertically are placed on the elevatable table, the plurality of support pins are inserted through the plurality of openings of the plurality of substrate accommodating trays placed on the elevatable table as the elevatable table moves down, so as to raise the substrate accommodated in the prescribed substrate accommodating tray.

8. A substrate transfer apparatus according to claim 5, wherein the tray holding unit holds each of the plurality of substrate accommodating trays in a horizontal state.

9. A substrate transfer apparatus according to claim 5, wherein the tray holding unit holds at least one of the plurality of substrate accommodating trays in a horizontal state, the at least one substrate accommodating tray accommodating a substrate.

10. A substrate transfer apparatus according to claim 5, wherein the tray holding unit includes an engaging claw to be engaged with the at least one substrate accommodating tray.

11. A substrate transfer apparatus according to claim 5, wherein the tray holding unit holds the at least one substrate accommodating tray by a frictional force.

12. A substrate transfer apparatus according to claim 7, wherein the elevatable table is moved up and down by a ball screw mechanism.

13. A substrate transfer apparatus according to claim 7, wherein the elevatable table is moved up and down by a belt transport mechanism.

14. A method for removing a substrate accommodated in each of a plurality of substrate accommodating trays stacked vertically, the method comprising the steps of:

(a) separating the lowest substrate accommodating tray, among a plurality of substrate accommodating trays each accommodating a substrate, from the second lowest substrate accommodating trays, among the plurality of substrate accommodating trays each accommodating a substrate, and lowering the lowest substrate accommodating tray; and

(b) inserting a plurality of support pins into a

plurality of openings formed in the lowered substrate accommodating tray, thereby raising a substrate accommodated in the lowered substrate accommodating tray moved down by the plurality of support pins.

15. A method according to claim 14, further comprising the step of (c) transferring the substrate raised by the plurality of support pins,

wherein the steps (a) through (c) are repeated.

16. A method for removing a substrate accommodated in each of a plurality of substrate accommodating trays stacked vertically, the method comprising the steps of:

(a) placing the plurality of substrate accommodating trays each accommodating a substrate on an elevatable table;

(b) holding, by a tray holding unit, at least one of a plurality of substrate accommodating trays each accommodating a substrate other than the lowest substrate accommodating tray among the plurality of substrate accommodating trays each accommodating a substrate;

(c) lowering the elevatable table and inserting a plurality of support pins into a plurality of openings formed in the substrate accommodating tray placed on the

elevatable table, thereby raising a substrate accommodated in the substrate accommodating tray placed on the elevatable table by the plurality of support pins; and

(d) transferring the substrate raised by the plurality of support pins.

17. A method according to claim 16, further comprising the steps of:

(e) after step (d), raising the elevatable table and contacting the substrate accommodating tray placed on the elevatable table with the lowest substrate accommodating tray among the at least one substrate accommodating tray held by the tray holding unit;

(f) releasing the at least one substrate accommodating tray from the tray holding unit and placing the released substrate accommodating tray on the elevatable table; and

(g) after step (f), performing steps (b) through (d) once more.

18. A method according to claim 17, wherein steps (e) through (g) are repeated.

19. A method for accommodating a substrate in each of a

plurality of substrate accommodating trays stacked vertically, the method comprising the steps of:

(a) placing at least one substrate accommodating tray accommodating no substrate on an elevatable table and inserting a plurality of support pins into a plurality of openings formed in the at least one substrate accommodating tray;

(b) placing a substrate on the plurality of support pins in a horizontal state;

(c) raising the elevatable table and accommodating the substrate supported by the support pins in the highest substrate accommodating tray among the at least one substrate accommodating tray; and

(d) holding the substrate accommodating tray, accommodating the substrate, by a tray holding unit.

20. A method according to claim 19, further comprising the step of:

(e) after step (d), lowering the elevatable table and inserting the plurality of support pins into a plurality of openings formed in at least one substrate accommodating tray accommodating no substrate,

wherein steps (b) through (e) are repeated.